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Mazdoor Kisan Shakti Sangathan

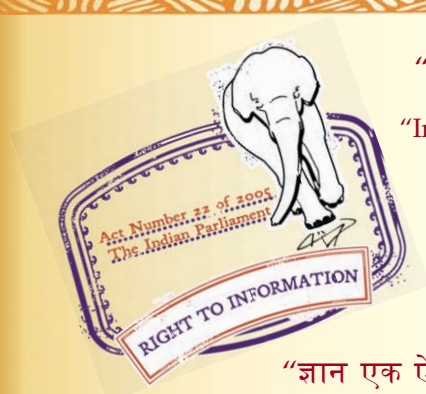
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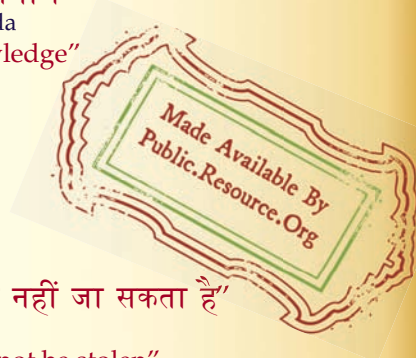
IS 9175-17 (1987): Rationalized Steels for Automobile and Ancillary Industry, Mechanical and Physical Properties - Part 17 35Mn6Mo4 Grade steel [MTD 16: Alloy Steels and Forgings]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR
RATIONALIZED STEELS FOR
THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 17 MECHANICAL AND PHYSICAL PROPERTIES OF
35Mn6Mo4 GRADE STEEL

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

**SPECIFICATION FOR
RATIONALIZED STEELS FOR
THE AUTOMOBILE AND ANCILLARY INDUSTRY**

**PART 17 MECHANICAL AND PHYSICAL PROPERTIES OF
35Mn6Mo4 GRADE STEEL**

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Indian Standard

SPECIFICATION FOR RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 17 MECHANICAL AND PHYSICAL PROPERTIES OF 35Mn6Mo4 GRADE STEEL

0. FOREWORD

0.1 This Indian Standard (Part 17) was adopted by the Indian Standards Institution on 15 January 1987, after the draft finalized by the Co-ordinating Committee on Materials for Automobiles had been approved by the Structural and Metals Division Council.

0.2 Part 1 of this standard was published in 1979 which covers the chemical composition of 33 rationalized steels. The mechanical properties, hardenability and isothermal transformation characteristics of these 33 rationalized steels are being covered in different parts of this standard (Parts 2 to 34). The data concerning these properties, given in this standard, is only for guidance and information purposes.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 17) covers the chemical composition, mechanical properties, hardenability and isothermal transformation characteristics of 35Mn6Mo4 grade of steel for use by automobile and ancillary industry.

1.2 This is a low-alloy steel intended to be used in the hardened and tempered condition.

*Rules for rounding off numerical values (revised).

2. CHEMICAL COMPOSITION

2.1 The chemical composition of this grade of steel shall be as given below:

<i>Constituents, percent</i>					
C	Si	Mn	Mo	S	P
0.30-0.40	0.15-0.35	1.30-1.80	0.35-0.55	0.035 Max	0.035 Max

3. HARDNESS

3.1 The maximum hardness for this grade of steel delivered in the annealed condition, when determined in accordance with IS : 1500-1983*, shall be 220 HB.

3.2 The surface hardness obtainable of this grade of steel by flame or induction hardening, shall be 53-59 HRC.

4. MECHANICAL PROPERTIES

4.1 The mechanical properties of this grade of steel in the hardened and tempered condition, when determined in accordance with IS : 1598-1977† and IS : 1608-1972‡, shall be as given in Table 1.

TABLE 1 MECHANICAL PROPERTIES IN HARDENED AND TEMPERED CONDITION

LIMITING RULING SECTION	TENSILE STRENGTH	0.2 PERCENT PROOF STRESS	ELONGATION ON GL5.65√S ₀	IZOD IMPACT	HARDNESS
(1)	(2)	(3)	(4)	(5)	(6)
	MPa	MPa	PERCENT	JOULES	HB
150	780 - 930	600	15	55	223 - 277
100	850 - 1 000	700	13	55	248 - 302
63	950 - 1 100	750	12	48	269 - 321

5. HOT WORKING AND HEAT TREATMENT TEMPERATURES

5.1 The recommended hot working and heat treatment temperatures shall be as given below:

Forging/rolling temperature	1 200°C, Max
Annealing temperature	830-860°C
Normalizing temperature	830-860°C
Process annealing temperature	640-660°C
Hardening temperature	830-860°C
Tempering temperature	660°C, Max

*Method for Brinell hardness test for metallic materials (*second revision*).

†Method for izod impact test of metals (*first revision*).

‡Method for tensile testing of steel products (*first revision*).

6. HARDENABILITY

6.1 The end quench hardenability curves/band and hardness traverse curves are given in Fig. 1 and 2.

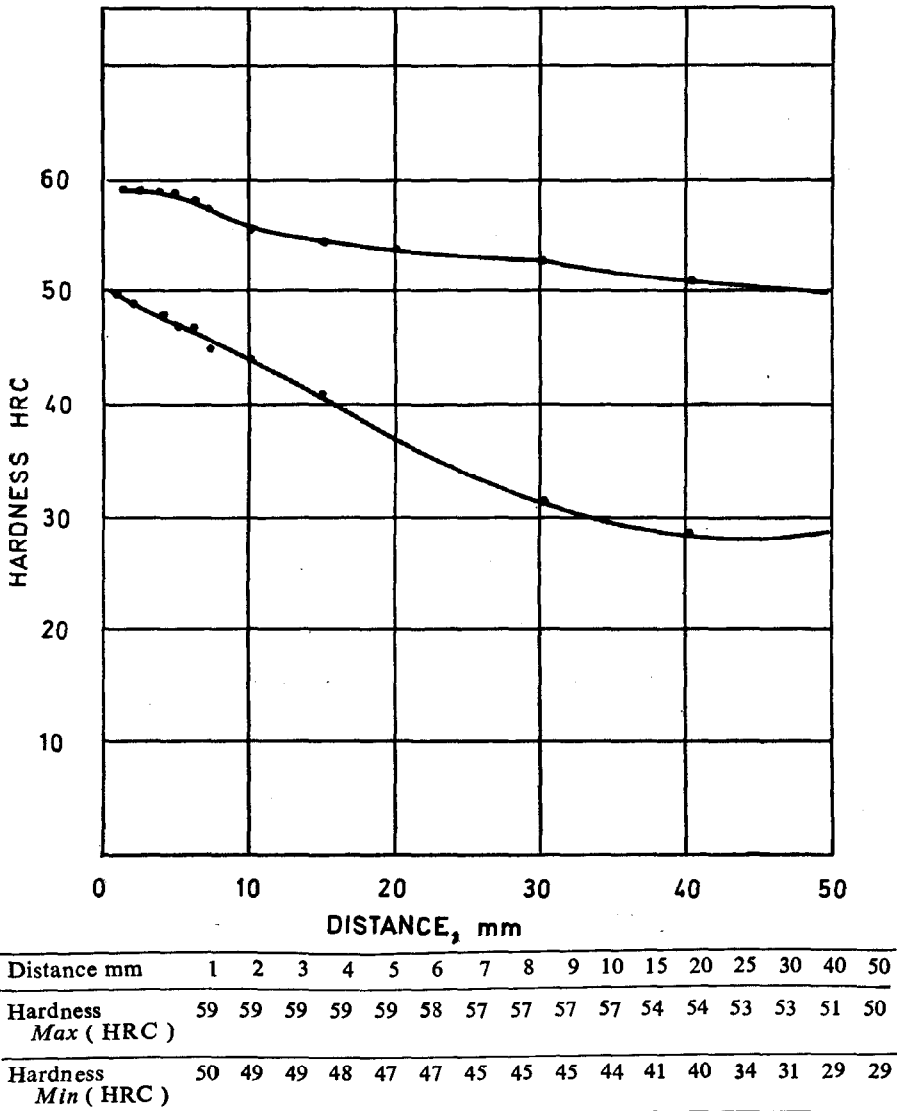
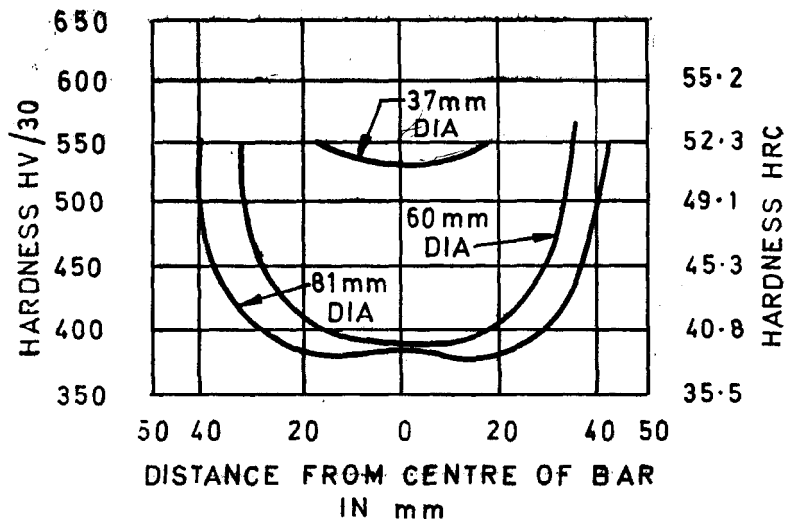


FIG. 1 END QUENCH HARDENABILITY CURVE OF 35 Mn6Mo4
GRADE STEEL



Chemical Composition, Percent

D	Si	Mn	S	P	Ni	Cr	Mo
0.33	0.15	1.40	0.022	0.030	0.21	0.40	0.37

Basic Open Hearth Steel

As Quenched Grain Size 6-8

Oil Quenched 860°C

FIG. 2 HARDNESS TRAVERSE CURVE OF 35Mn6Mo4 GRADE STEEL

7. EFFECT OF TEMPERING TEMPERATURE ON MECHANICAL PROPERTIES

7.1 The curves showing the effect of tempering temperature on mechanical properties of the steel are given in Fig. 3.

8. EFFECT OF SECTION SIZE ON MECHANICAL PROPERTIES

8.1 The curves for the effect of section size on mechanical properties are given in Fig. 4.

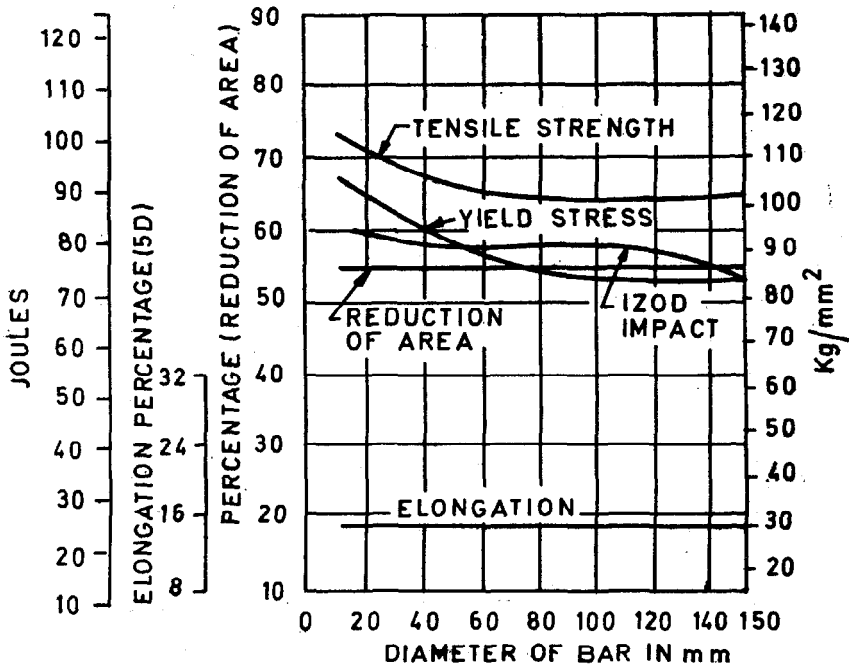


FIG. 3 CURVES SHOWING THE EFFECT OF TEMPERING TEMPERATURE ON MECHANICAL PROPERTIES OF 35Mn6Mo4 GRADE STEEL

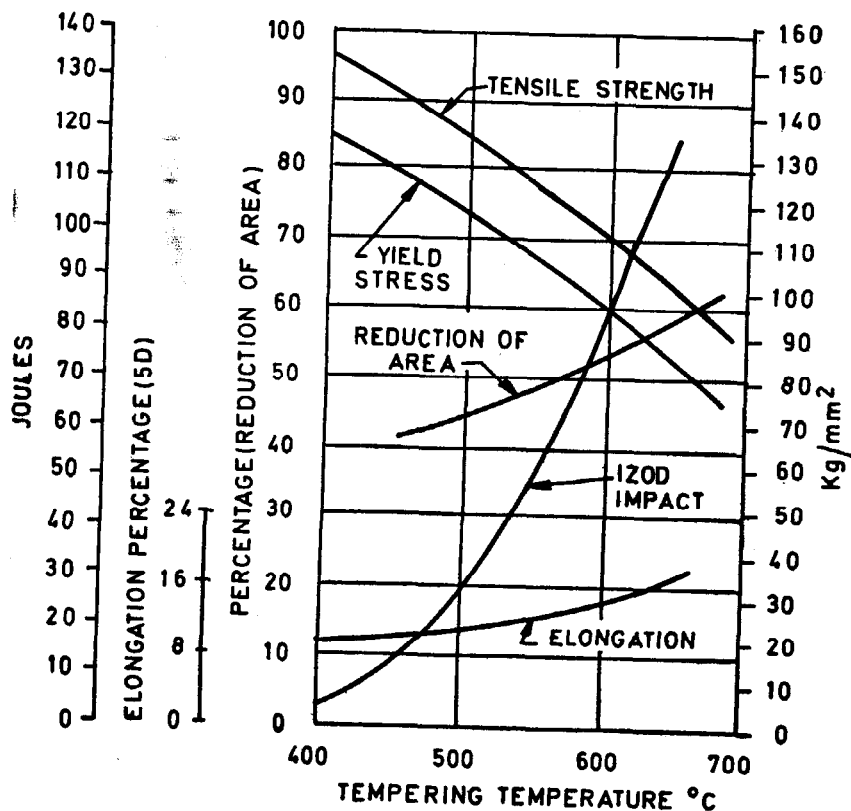


FIG. 4 CURVES SHOWING THE EFFECT OF SECTION SIZE OF MECHANICAL PROPERTIES OF 35Mn6Mo4 GRADE STEEL

(Continued from page 2)

Panel to Collect Data on Steel for Automobile Purpose, SMDC 31 : P-12

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	$1 \text{ N} = 1 \text{ kg.m/s}^2$
Energy	joule	J	$1 \text{ J} = 1 \text{ N.m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J/s}$
Flux	weber	Wb	$1 \text{ Wb} = 1 \text{ V.s}$
Flux density	tesla	T	$1 \text{ T} = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	$1 \text{ Hz} = 1 \text{ c/s(s}^{-1}\text{)}$
Electric conductance	siemens	S	$1 \text{ S} = 1 \text{ A/V}$
Electromotive force	volt	V	$1 \text{ V} = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$